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IS 5235 (1992): Meteorology - Raingauge, recording [PGD 21: Meteorological Instruments]

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(पहला पुनरीक्षण)

Indian Standard

METEOROLOGY — RAINGAUGES RECORDING — SPECIFICATION

(First Revision)

UDC 551·508·77

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

December 1992

Price Group 4

AMENDMENT NO. 1 APRIL 2001
TO
IS 5235 : 1992 METEOROLOGY — RAINGAUGES RECORDING — SPECIFICATION

(*First Revision*)

(*Page* 5, *clause* **8.3.7**) — Insert the following sentence at the end:

'Suitable fibre tipped disposable pen can also be used.'

(BP 21)

Reprography Unit, BIS, New Delhi, India

Meteorological Instruments Sectional Committee, LM 21

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by Meteorological Instruments Sectional Committee had been approved by the Light Mechanical Engineering Division Council.

Accuracy in the measurement of rainfall is of great importance in almost all fields of national economy and is of special significance in agriculture, irrigation, design of water-ways, flood control and power generation, and in the conservation of Water resources on both national and international scales. The Director General of Meteorology, New Delhi, has been designated the sole authority for ensuring the correct rainfall registration in India, and the India Meteorological Department is at present responsible for the testing and certification of all types of raingauges and rain measures made within the country. All rain fall registration authorities have also been instructed to use only raingauges and rain measures tested and certified by the India Meteorological Department.

Specifications for the various types of raingauge in use at the rainfall stations in the country have been prepared by the India Meteorological Department, but no Indian Standard Specifications for these exist. With the manufacture in large numbers of raingauges, both recording and non recording, and their increasing use by various organizations, the formulation of Indian Standards for raingauges and their certification by BIS has become urgent.

Indian Standard Specifications on non-recording raingauges (IS 5225 Specification for raingauge, non recording) and rain measures (IS 4849 Specification for rain measures) have been published in the interests of standardization of instruments and the accuracy of measurement of rainfall. The present standard deals with the recording raingauges most commonly in use in the country.

This standard was originally published in 1969. This revision is based on further experience gained in the manufacture of meteorological instruments and other developments in this field.

Main modifications carried out in this revision are:

a) Clause **2** giving all the referred standards in this specification has been incorporated;

b) Table 1 has been modified; and

c) Clauses **7.1.2**, **7.3.9** and **7.3.13** have been modified.

In the formulation of this standard, the consideration has been given to the requirements laid down by the World Meteorological Organization, Geneva, in addition to the special requirements obtaining in this country.

For the purpose of deciding whether a particular requirments of this standard is complied with the, final value, observed or calculated expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specificed value in this standard.

Indian Standard

METEOROLOGY — RAINGAUGES RECORDING — SPECIFICATION

(First Revision)

1 SCOPE

1.1 This standard specifies the requirements for natural siphon type recording raingauges.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Tilte*
617 : 1975	Aluminium and aluminium alloys ingots and castings for general engineering purposes (*second revision*)
1382 : 1981	Glossary of terms relating to glass and glassware (*first revision*)
4426 : 1967	Methods of sampling laboratory glassware and medical glass instruments
4849 : 1992	Meteorology — Rainmeasures — Specification (*first revision*) (*under print*)
5924 : 1988	Clock mechanisms and drums for meteorological instruments (*first revision*)
5947 : 1970	Charts for recording meteorological instruments

3 DESCRIPTION

3.1 The recording raingauge consists of a collector and a rainfall recording mechanism mounted on a base. The rainfall measuring unit consists of a float chamber containing a light metal float and a siphon chamber. Rain from the collector is led into the float chamber through an inlet tube and as the float rises, a pen fixed to the float rod draws a line on a chart wound on a rotating drum driven by clockwork. The discharge tube is inside and coaxial with the outer tube of the siphon chamber. The top of this outer tube has a polished glass cap and the discharge tube comes to within a very short distance of this. When the level of water in the outer tube rises with that of the water in float chamber and flows over the bend, capillary action causes all the air to be pushed out and down the delivery tube so that a full, flow is started at once. Similarly, at the end of the siphoning, once air gets to the top of the tube the siphoning action is stopped immediately. When siphoning occurs, the pen fixed on the float rod falls to the zero mark on the chart and the gauge is ready to record rainfall again.

4 TYPES

4.1 The recording raingauges shall be of two types depending on the intensity of the rainfall to be measured:

a) Recording Raingauge for 10 mm Rainfall— Natural siphon recording raingauge having a collector 325 cm^2 in area with a range 0 to 10 mm of rainfall per siphoning for use in regions of light or medium rainfall, and

b) Recording Raingauge for 25 mm Rainfall— Natural siphon recording raingauge having a collector 130 cm^2 in area with a range 0 to 25 mm of rainfall per siphoning for use in regions of heavy rainfall.

5 MATERIALS

5.1 The material used for the fabrication of the collector and base of the recording raingauges shall have the following properties:

a) Rigidity and strength with no distortion or other deterioration when exposed to widely varying climatic conditions in the open air, while at the same time being light in weight. Suitable ultraviolet inhibitor to be added to increase its durability.

b) Freedom from attack by animal, insect or fungoid life.

c) Smooth and permanent surface finish so as to facilitate free flow of precipitation.

d) Low thermal conductivity so as to minimize evaporation losses or condensation gains.

e) A life of not less than 15 years in the open.

5.1.1 While any material satisfying the above requirements may be used, glass reinforced polyester is considered as a suitable material.

5.2 The material used for the manufacture of the recording mechanism shall be gun metal or similar material so that it is capable of being finished to specified dimensions and is not affected in any manner by permanent contact with ordinary water for prolonged periods extending to a number of years.

5.3 The material for the rim of the collector shall be gun metal or aluminium alloy conforming to Grade A 9 of IS 617 : 1975.

6 DIMENSIONS

6.1 The main dimensions for recording raingauges shall be as given in Fig. 1 and Table 1.

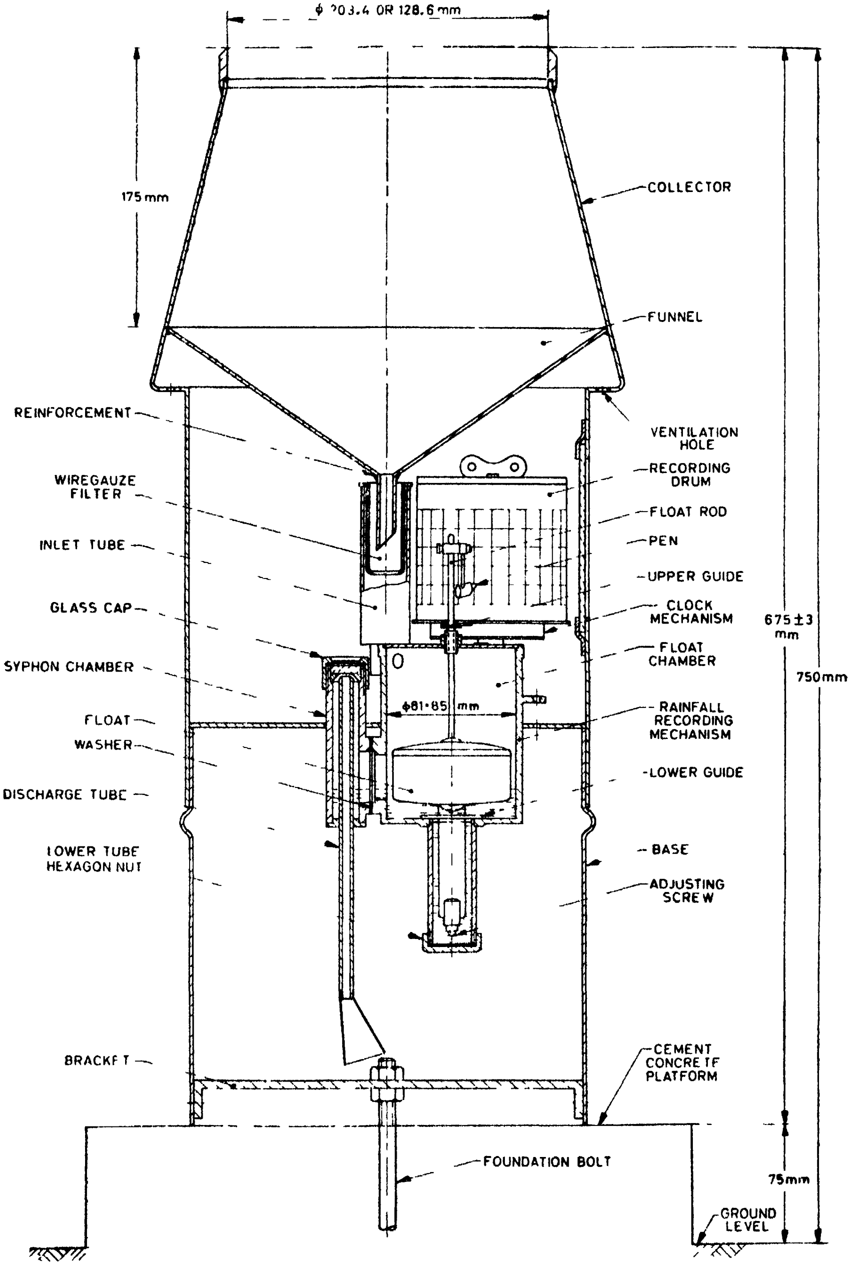


FIG. 1 DIMENSIONS AND NOMENCLATURE OF NATURAL SYPHON RECORDING MECHANISM

Table 1 Main Dimensions of Recording Raingauges

(*Clauses* 6.1 *and* 8.3.10)

All dimensions in millimetres.

Particulars	Raingauge for 10 mm Rainfall	Raingauge for 25 mm Rainfall
Nominal thickness (base and collector), *Min*	3	3
Overall height	675 ± 3	675 ± 3
Internal diameter of gun metal rim	203 to 203·4	128·5/128·6
Depth of funnel from upper edge of rim, *Min*	175	175
Internal diameter of funnel outlet pipe	10	10
Height to which float has to rise from zero for discharge	60·0	60·0
Diameter of clock drum	93·3	93·3
Heigh of drum above flange	92	92

6.2 The inside diameter of the collector rim shall be correct within ± 0·5 mm of the specified value when measured in any four directions and the mean of the four values shall be within ± 0·2 mm of the specified value.

7 DESIGNATION

7.1 For the purposes of inquiry or order, recording raingauges shall be designated by the maximum of the range of rainfall per siphoning as shown under **4.1**.

Example:

> A complete recording raingauge with a range 0 to 10 mm rainfall per siphoning, conforming to this stardard shall be designated as:
>
> Raingauge, Recording 10 mm Rainfall IS 5235

8 GENERAL REQUIREMENTS

8.1 Collector

The collector shall have a rim cemented firmly at the top The rim, having a knife edge, shall be truly circular and have the diameters specified for the two types of raingauges. The inner surface of the rim and the inside vertical wall of the funnel shall be in one plane. The entire inner surface of the funnel shall have a smooth finish. The external shape of the collector shall be slightly tapered with the lesser diameter at top.

8.1.1 All seams and joints, if any, of the collector shall be of adequate strength and shall be water tight. The junction between the funnel and funnel outlet tube shall specially be reinforced as shown in Fig. 2.

8.1.2 The collector shall have eight ventilation holes of about 5 mm diameter, drilled at equal distances. The holes shall be covered inside with fine brass mesh and shall be suitably shielded to prevent ingress of water (*see* Fig. 1).

8.1.3 The collector shall be provided with a cut-away window of 100 × 100 mm so that the chart is visible from outside, without removing the collector. The window shall be covered with a transparent sheet of acrylic plastic which may be slid in grooves framing the window and fixed in position (*see* Fig. 2).

8.1.4 A suitable rust-proof locking device shall be provided in the collector to lock it to the base.

8.1.5 The collector shall fit smoothly over the base and rest on it so that when assembled the rim is horizontal.

8.2 Base

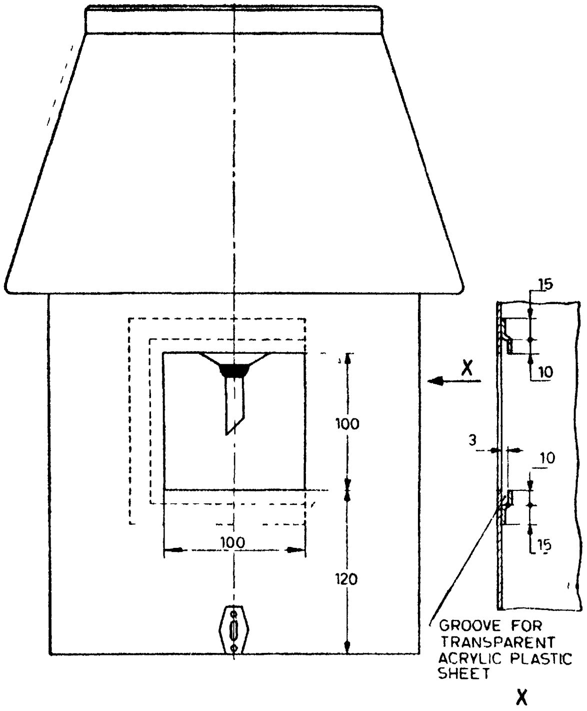
The base shall be strong enough to support without yielding the collector as well as the recording mechanism. The top of the base shall be reinforced for this purpose.

8.2.1 A strong rust-proof bracket shall be provided at the bottom of the base to enable it to be anchored securely in the cement concrete platform on which the raingauge is permanently fixed.

8.3 Recording Mechanism

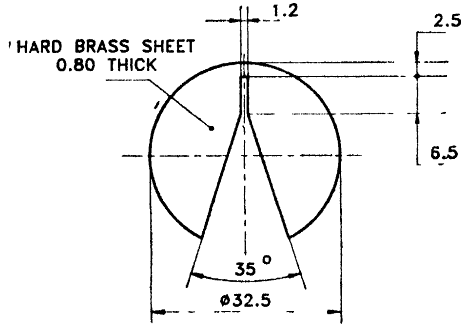
The recording mechanism shall be of the natural-siphon type and the design shall be such that the water in the float chamber is emptied immediately and rapidly by the siphon as soon as the specified amount of water has been collected. The complete mechanism shall be water-tight and the siphon action shall start and end sharply. This may conveniently be achieved by interposing in the passage between the float chamber and siphon chamber a thin disc with a V-shaped opening in it. The disc shall have the dimensions shown in Fig. 3. The distance between the glass cap at the top of the siphon chamber and the open end of the discharge tube shall 1·7±0·1 mm for a discharge tube having a diameter of 4·7 mm. Two washers, one of suitable packing material and another of metal above it, shall be provided over the glass disc. They shall have the dimensions given in Fig. 4.

8.3.1 For both types of raingauges, the discharge of water shall-take place soon after the collection of 324·9 cm^3 + 3·2 cm^3 of water corresponding to 10 mm of rainfall in the 10 mm raingauge and 25 mm of rainfall in the 25 mm raingauge. The measure glasses shall meet the requirements of Type 4 and Type 5 given in IS 4849 : 1992.



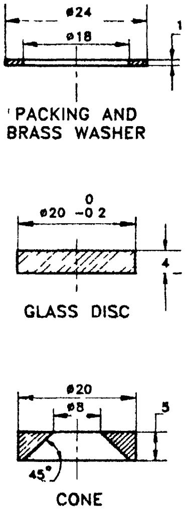
All dimensions in millimetres.

Fig. 2 Window of Collector



All dimensions in millimetres.

Fig. 3 Dimensions for V-Disc



All dimensions in millimetres.

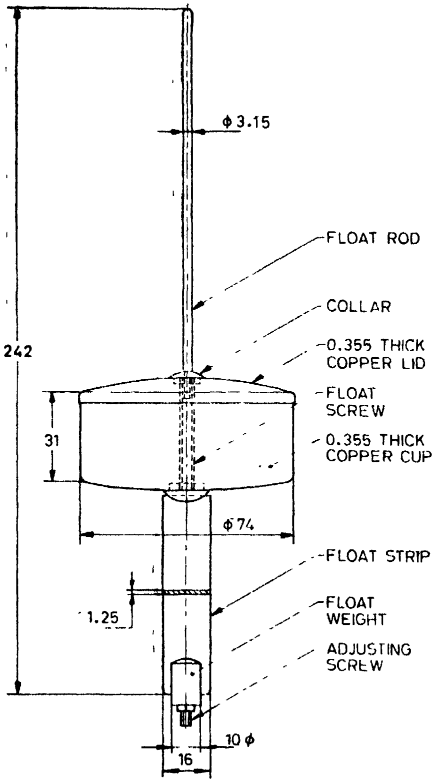
Fig. 4 Dimensions for Washers, Glass Disc and Cone for Syphon Tube

8.3.2 The siphon shall be capable of discharging the collected water and bringing the recording pen back to zero in a period not exceeding 15 seconds.

8.3.3 There shall be no dribbling of water before siphoning even when the rate of rainfall is as low as 0·1 mm per hour.

8.3.4 After siphoning, the addition of water equivalent to 0·1 mm of rain in 10 mm raingauge and 0·2 mm of rain in 25 mm raingauge shall produce a perceptible rise of the pen.

8.3.5 The shape and main dimensions of the float of the recording mechanism shall be as shown in Fig. 5.



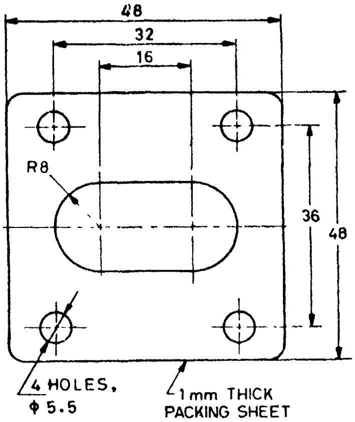
All dimensions in millimetres.

FIG. 5 DIMENSIONS FOR FLOAT

8.3.5.1 While other suitable dimensions may also be devised, the following dimensions for the components are found to satisfy the conditions laid down in the above clause (*see* Fig. 1 and 5):

a) Internal diameter of the float chamber	81·85 mm
b) Total weight of the float	94 to 98 g

8.3.5.2 Between the float chamber and the siphon chamber shall be interposed a suitable packing material washer of the shape and dimensions given in Fig. 6 to prevent leakage of water. The siphon chamber shall be fixed to the float chamber by means of four screws, with provision for adjusting the former for correct siphoning.



All dimensions in millimetres.

FIG. 6 PACKING WASHER FOR FLOAT AND SYPHON CHAMBER

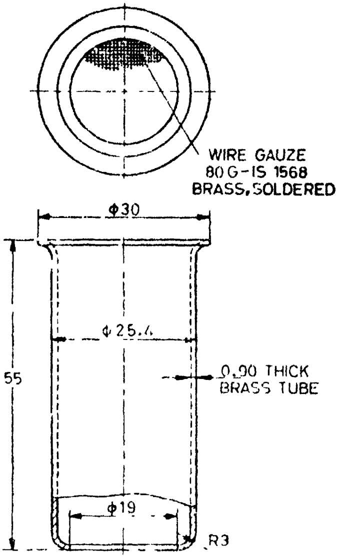
8.3.5.3 The lower end of the float chamber shall be provided with a threaded hexagonal cap, which may be removed for cleaning the float chamber (*see* Fig. 1).

8.3.6 The wire gauze filter tube shall be a loose fit inside the inlet tube and shall be as shown in Fig. 7.

8.3.7 The recording pen shall yield a clear trace when moving either vertically or horizontally relative to the chart. It shall be provided with an adjusting screw to permit ready adjustment of zero. It shall be made to have the dimensions given in Fig. 8(A) or 8(B).

8.3.8 The recording pen shall not have any lateral play and shall trace the same vertical line on the chart, while going up or coming down, with the drum not rotating.

8.3.9 Recording raingauges shall have a clockwork mechanism conforming to IS 5924 : 1988 and capable of running for eight days on one winding. The clockwork shall have a drum shell mounted over it friction tight. The drum shell shall be capable of being adjusted for height within a range of 10 mm with respect to the clockwork mechanism. It shall have a flange and a chart clip. Each clockwork shall be provided with an interchangeable winding key.



All dimensions in millimetres.

FIG. 7 WIRE GAUZE FILTER

8.3.10 The drum diameter and drum height shall conform to the dimensions given in Table 1.

8.3.11 The recording pen shall traverse on the clockdrum a distance of 276+1 mm at 27°C corresponding to 24 hours on the chart when the regulator is in the central neutral position. With the regulator at either extreme positions of fast or slow, the distance covered shall be capable of variation by at least one millimetre corresponding to about 5 minutes on the chart.

8.3.12 The clockwork mechanism shall be so compensated for temperature that the distance traversed by the recording pen in 24 hours with regulator at the central neutral position lies between 270 and 279 mm for all temperatures between 0 and 40°C.

8.3.13 The charts used with recording raingauges shall conform to IS 5947 : 1970.

9 WORKMANSHIP AND FINISH

9.1 All parts shall be leak-proof and when assembled the level of the rim of the collector shall be truly horizontal.

9.2 The external surfaces of the raingauge shall have a smooth and permanent finish.

9.3 The raingauges shall be of any light colour but a light shade of grass green or cream is preferred.

9.4 All metal parts shall be suitably treated so as to protect them from rusting or other deterioration.

10 MARKING

10.1 Each raingauge shall bear the following inscription engraved legibly and neatly on a name plate which shall be cemented firmly on the lid of the float chamber:

a) Nominal size as shown in **4.1**;

b) Manufacturer's name or recognized trade-mark; and

c) Serial number and year of manufacture, for example, No. 123/92.

10.1.1 *Standard Mark*

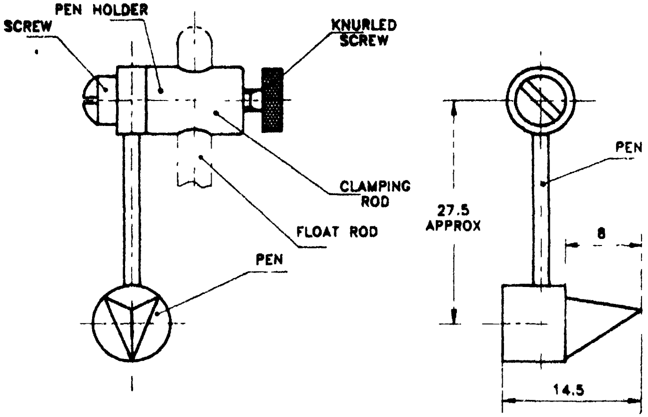
Details available with the Bureau of Indian Standards.

11 PACKING

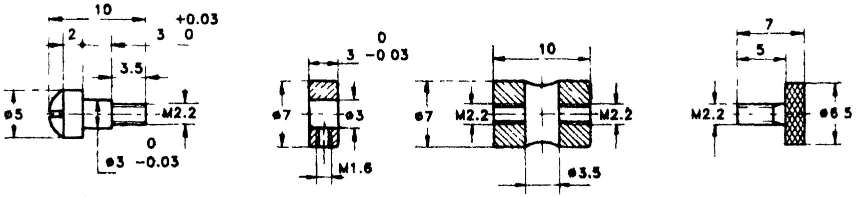
11.1 Each raingauge without the recording mechanism and clockdrum shall be placed in a corrugated cardboard carton with suitable cushioning. The edge of the gun metal rim shall be adequately protected from damage. The recording mechanism and clockwork with drum shell shall be securely-packed separately in another corrugated cardboard carton. The two cartons shall be packed in a strong wooden box using suitable packing material. Alternately the raingauge shall be packed as agreed to between the supplier and the purchaser.

12 TESTING AND INSPECTION

12.1 All raingauges shall be tested individually for conformity to all the requirements of this specification.



PEN ASSEMBLY

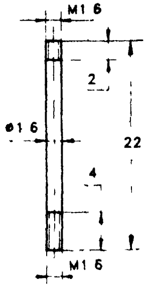


SCREW

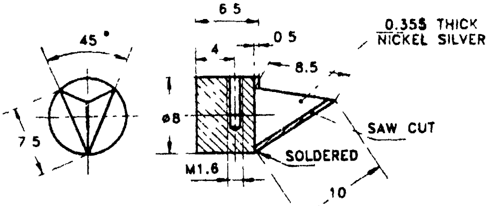
PEN HOLDER

CLAMPING ROD

KNURLED SCREW



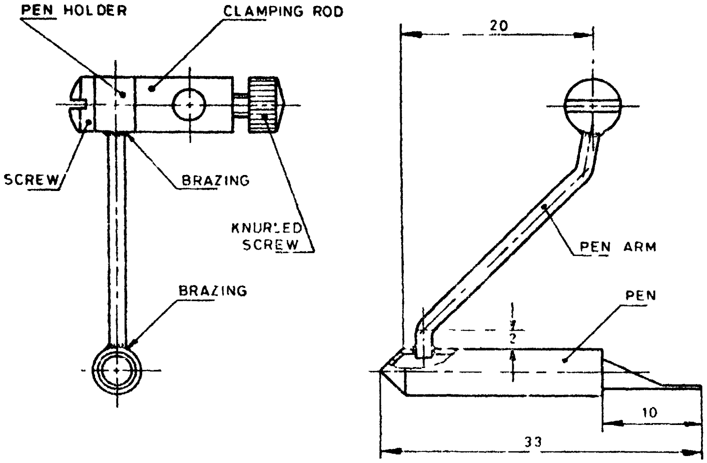
PEN ARM



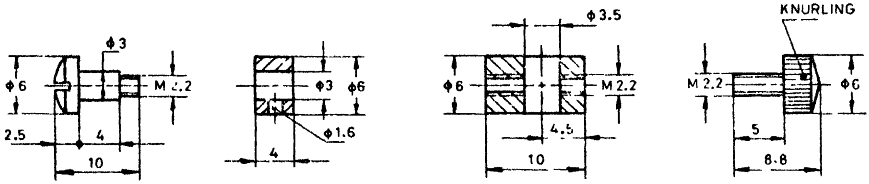
PEN

All dimensions in millimetres.

FIG. 8A Assembly and Details of Pen (*Continued*)



PEN ASSEMBLY

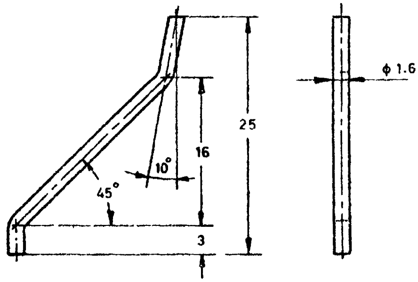


SCREW

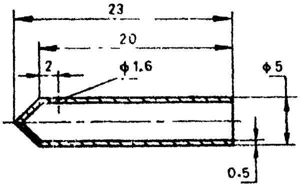
PEN HOLDER

CLAMPING ROD

KNURLED SCREW



PEN ARM



PEN

All dimensions in millimetres.

FIG. 8B ASSEMBLY AND DETAILS OF PEN

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